AST

## SEQUENCE LISTING

INFORMATION FOR SEC ID NO:1:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 994 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: both
  - (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: cDNA

## (ix) FEATURE:

- (A) NAME/KEY: CDS
- (B) LOCATION: 41..508
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

CGGAGAGGGG	GAGA	ACAG!	AC A	ACGG	GCGG	G GGG	ATG Met 1			55
GGG AGC AG Gly Ser Se										103

CGG GGT CGG GTA GAG GAG GTG CGG GCG CTG CTG GAG GCG GTG GCG CTG Arg Gly Arg Val Glu Val Arg Ala/Leu Leu Glu Ala Val Ala Leu

CCC AAC GCA CCG AAT AGT TAC GGT /GG AGG CCG ATC CAG GTC ATG ATG Pro Asn Ala Pro Asn Ser Tyr Gly Arg Arg Pro Ile Gln Val Met Met

ATG GGC AGC GCC CGA GTG GCG GAG CTG CTG CTC CAC GGC GCG GAG

Met Gly Ser Ala Arg Val Ala Glu Leu Leu Leu Leu His Gly Ala Glu

55
65

CCC AAC TGC GCC GAC CCC GCC ACT CTC ACC CGA CCC GTG CAC GAC GCT
Pro Asn Cys Ala Asp Pro Ala Thr Leu Thr Arg Pro Val His Asp Ala
70
80
85

GCC CGG GAG GGC TTC CYG GAC ACG CTG GTG CTG CAC CGG GCC GGG Ala Arg Glu Gly Phe Meu Asp Thr Leu Val Val Leu His Arg Ala Gly

GCG CGG CTG GAC GTG CGC GAT GCC TGG GGC CGT CTG CCC GTG GAC CTG
Ala Arg Leu Asp Val Arg Asp Ala Trp Gly Arg Leu Pro Val Asp Leu
105 115 115

GCT GAG GAG CTG GGC CAT CGC GAT GTC GGC TAC CTG CGC GCG GCT A39 Ala Glu Glu Leu Gly His Arg Asp Val Ala Arg Tyr Leu Arg Ala Ala 120 125 130

487

GCG GGG GG€ ACC AGA GGC AGT AAC CAT GCC CGC ATA GAT GCC GCG GAA

Ala Gly Gly Thr Arg Gly Ser Asn His Ala Arg Ile Asp Ala Ala Glu 135 140 145	
GGT CCC TCA GAC ATC CCC GAT TGAAAGAACC AGAGAGGCTC TGAGAAACCT Gly Pro Ser Asp Ile Pro Asp 150 155	538
CGGGAAACTT AGATCATCAG TCACCGAAGG TCCTACAGGG CCACAACTGC CCCCGCCACA	598
ACCCACCCCG CTTTCGTAGT TTTCATTTAG AAAATAGAGC TTTTAAAAAT CTCCTGCCTT	658
TTAACGTAGA TATAAGCCTT CCCCCACTAC CGTAAATGTC CATTTATATC ATTTTTTATA	718
TATTCTTATA AAAATGTAAA AAAGAAAAAC ACCGCTTCTG CCTTTTCACT GTGTTGGAGT	778
TTTCTGGAGT GAGCACTCAC GCCCTAAGCG CACATTCATG TGGGCATTTC TTGCGAGCCT	838
CGCAGCCTCC GGAAGCTGTC GACTTCATGA CAAGCATTTT GTGAACTAGG GAAGCTCAGG	898
GGGGTTACTG GCTTCTCTTG AGTCACACTG CTAGCAAATG GCAGAACCAA AGCTCAAATA	958
AAAATAAAAT TATTTTCATT CATTCACTCA AAAAAA	994
(2) INFORMATION FOR SEQ ID NO:2:  (i) SEQUENCE CHARACTERISTICS:  (A) LENGTH: 156 aming acids (B) TYPE: aming acids (D) TOPOLOGY: linear  (ii) MOLECULE TYPE: protein  (xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:	
Met Asp Pro Ala Ala Gly ser Ser Met Glu Pro Ser Ala Asp Trp Leu 1 10 15	
Ala Thr Ala Ala Ala Aeg Gly Arg Val Glu Glu Val Arg Ala Leu Leu 20 25 30	
Glu Ala Val Ala Leu Pro Asn Ala Pro Asn Ser Tyr Gly Arg Arg Pro 45 45	
Ile Gln Val Met Met Met Gly Ser Ala Arg Val Ala Glu Leu Leu Leu 50 60	
Leu His Gly Ala Glu Pro Asn Cys Ala Asp Pro Ala Thr Leu Thr Arg 65 70 80	
Pro Val dis Asp Ala Ala Arg Glu Gly Phe Leu Asp Thr Leu Val Val 85 90	
Leu His Arg Ala Gly Ala Arg Leu Asp Val Arg Asp Ala Trp Gly Arg	

Led Pro Val Asp Leu Ala Glu Glu Leu Gly His Arg Asp Val Ala Arg 115 120 125 Tyr Leu Arg Ala Ala Ala Gly Gly Thr Arg Gly Ser Asn His Ala Arg 130 135 Ile Asp Ala Ala Glu Gly Pro Ser Asp Ile Pro Asp 150 (2) INFORMATION FOR SEO ID NO:3: (i) SEQUENCE CHARACTERISTICS: (A) LENGTH: 837 base pairs (B) TYPE: nucleic acid (C) STRANDEDNESS: single (D) TOPOLOGY: linear (ii) MOLECULE TYPE: cDNA (ix) FEATURE: (A) NAME/KEY: CDS (B) LOCATION: 328..738 (xi) SEQUENCE DESCRIPTION: SEQ ID/NO:3: GAGGACTCCG CGACGGTCCG CACCCTGCGG CCAGAGCGGC TTTGAGCTCG GCTGCTTCCG 60 CGCTAGGCGC TTTTTCCCAG AAGCAATCCA/GGCGCGCCCG CAGGTTCTTG AGCGCCAGGA 120 AAAGCCCGGA GCTAACGACC GGCCGCTCGG CACTGCACGG GGCCCCAAGC CGCAGAAGAA 180 GGACGACGGG AGGGTAATGA AGCTGAGCCC AGGTCTCCTA GGAAGGAGAG AGTGCGCCGG 240 AGCAGCGTGG GAAAGAAGGG AAGAGTGTCG TTAAGTTTAC GGCCAACGGT GGATTATCCG 300 GGCCGCTGCG CGTCTGGGGG CXGCGGA ATG CGC GAG GAG AAC AAG GGC ATG 351 Met Arg Glu Glu Asn Lys Gly Met CCC AGT GGG GGC GGG AGC GAT GAG GGT CTG GCC ACG CCG GCG CGG GGA 399 Pro Ser Gly Gly Gry Ser Asp Glu Gly Leu Ala Thr Pro Ala Arg Gly 10 15 CTA GTG GAG AAC GTG CGA CAC TCC TGG GAA GCC GGC GCG GAT CCC AAC 447 Leu Val Glu Lys Val Arg His Ser Trp Glu Ala Gly Ala Asp Pro Asn 25 GGA GTC ANC CGT TTC GGG AGG CGC GCG ATC CAG GTC ATG ATG ATG GGC 495 Gly Val Asn Arg Phe Gly Arg Arg Ala Ile Gln Val Met Met Gly 45 AGC GC CGC GTG GCG GAG CTG CTG CTC CAC GGC GCG GAG CCC AAC 543 Ser Ala Arg Val Ala Glu Leu Leu Leu His Gly Ala Glu Pro Asn 60

TÉC GCA GAC CCT GCC ACT CTC ACC CGA CCG GTG CAT GAT GCT GCC CGG

ys Ala Asp Pro Ala Thr Leu Thr Arg Pro Val His Asp Ala Ala Arg

SSSTC80

Q

8 SOETO 75 85 ឧ೧

GAG GGC TTC CTG GAC ACG CTG GTG GTG CTG CAC CGG GCC GGG GCG CGG 639 Glu Gly Phe Leu Asp Thr Leu Val Val Leu His Arg Ala Gly Ala Arg CTG GAC GTG CGC GAT GCC TGG GGT CGT CTG CCC GTG GAC TTG GCC GAG 687 Leu Asp Val Arg Asp Ala Trp Gly Arg Leu Pro Val Asp Leu Ala Glu 105 110 GAG CGG GGC CAC CGC GAC GTT GCA GGG TAC CTG CGC ACA GCC ACG GGG 735 Glu Arg Gly His Arg Asp Val Ala Gly Tyr Leu Arg Thr Xia Thr Gly GAC TGACGCCAGG TTCCCCAGCC GCCCACAACG ACTTTATTTT CTTACCCAAT 788 Asp TTCCCACCC CACCCACCTA ATTCGATGAA GGCTGCCAAQ GGGGAGCGG 837 (2) INFORMATION FOR SEQ ID NO:4: (i) SEQUENCE CHARACTERISTICS (A) LENGTH: 137 aming acids (B) TYPE: amino acid (D) TOPOLOGY: linear (ii) MOLECULE TYPE: protein (xi) SEQUENCE DESCRIPTION: SEQ ID NO:4: Met Arg Glu Glu Asn Lys bly Met Pro Ser Gly Gly Gly Ser Asp Glu Gly Leu Ala Thr Pro Ala Arg Gly Leu Val Glu Lys Val Arg His Ser 20 Trp Glu Ala Gly Ala Asp Pro Asn Gly Val Asn Arg Phe Gly Arg Arg 35 Ala Ile Gln Va/1 Met Met Met Gly Ser Ala Arg Val Ala Glu Leu Leu 50 Leu Leu Hig Gly Ala Glu Pro Asn Cys Ala Asp Pro Ala Thr Leu Thr 65 Val His Asp Ala Ala Arg Glu Gly Phe Leu Asp Thr Leu Val

Val Leu His Arg Ala Gly Ala Arg Leu Asp Val Arg Asp Ala Trp Gly 105 arg Leu Pro Val Asp Leu Ala Glu Glu Arg Gly His Arg Asp Val Ala 120

125

Gly Tyr Leu Arg Thr Ala Thr Gly Asp

(2)	TMECOMATION	FOD	SEO	TD	NO · 5

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 853 base pairs
    - (B) TYPE: nucleic acid
    - (C) STRANDEDNESS: both
    - (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: cDNA
- (ix) FEATURE:
  - (A) NAME/KEY: CDS
  - (B) LOCATION: 213..587
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

GGAGTACAGC	AGCGGGAGCA	TGGGTCGCAG	GTTCTTGG7C	ACTGTAAGGA	TTCAGCGCC

60

120

180

233

329

377

- GGGCCGCCCA CTCCAAGAGA GGGTTTTCTT GGTGAAGTTC GTGCGATGCC GGAGACCCAG
- GACAGCGAGC TGCGCTCTGG CTTTCGTGAA CATGTTGTTG AGGCTAGAGA GGATCTTGAG
- AAGAGGGCCG CACCGGAATC CTGGACCAGG TG ATG ATG ATG AGC GAC GAT CAC Met Met Met Gly Asn Val His
- GTA GCA GCT CTT CTG CTC AAC TAC GGT GCA GAT TCG AAC TGC GAG GAC

  Val Ala Ala Leu Leu Leu Asn Tyr G17 Ala Asp Ser Asn Cys Glu Asp

  10

  15

  20
- CCC ACT ACC TTC TCC CGC CCG GTG CAC GAC GCA GCG CGG GAA GGC TTC Pro Thr Thr Phe Ser Ary Pro Val His Asp Ala Ala Arg Glu Gly Phe 25
- CTG GAC ACG CTG GTG GTG CTG CAC GGG TCA GGG GCT CGG CTG GAT GTG
  Leu Asp Thr Leu Vad Val Leu His Gly Ser Gly Ala Arg Leu Asp Val
  45 50 55
- CGC GAT GCC TGG GGT CGC CTG CCG CTC GAC TTG GCC CAA GAG CGG GGA 425 Arg Asp Ala Typ Gly Arg Leu Pro Leu Asp Leu Ala Gln Glu Arg Gly 65 70
- CAT CAA GAC ATC GTG CGA TAT TTG CGT TCC GCT GGG TGC TCT TTG TGT 473 His Gln Asp Ile Val Arg Tyr Leu Arg Ser Ala Gly Cys Ser Leu Cys 75 80 85
- TCC QCT GGG TGG TCT TTG TGT ACC GCT GGG AAC GTC GCC CAG ACC GAC
  Ser Ala Gly Trp Ser Leu Cys Thr Ala Gly Asn Val Ala Gln Thr Asp
  90 95 100
- GG CAT AGC TTC AGC TCA AGC ACG CCC AGG GCC CTG GAA CTT CGC GGC 569
  Gly His Ser Phe Ser Ser Ser Thr Pro Arg Ala Leu Glu Leu Arg Gly 105
  1105
  1106

			GAG Glu			TAAI	ATCC	GCC '	rcago	cccc	CC T	TTTT	CTTC	т	/		61
TAG	TTC	ACT 1	CTAC	CGA	rg C1	raged	STGT	C TA	CAT	STGG	CTT	AAAT	AAA	TACA	тарта	A	67
TGC	TTTT:	TTT (	GCAA1	CAC	GG GI	AGGG <i>I</i>	AGCA	G AG	GAG	GGAG	CAG	AAGG	AGG (	GAGG	SAGGG	A	73
GGG!	AGGG	ACC :	rgga	CAGG	AA AC	GAA:	rggcz	A TG	AGAA	ACTG	AGC	GAAG	GCG (	zcc	CGAAG	3	79
GAA?	PAATO	GC 1	rggat	rtgti	T A	LAAA.	ATA	A AA	TAAA	SATA	CTT	TTTA	rza .	TGTC	AA		85
(2)			rion								,	/	•				
		(i) :	(B)	LE1	CHAP NGTH: PE: a	: 125 umino	am:	ino a id		; /							
	(:	ii) 1	OLE	CULE	TYPE	: p1	rote	in	,								
	(:	xi) s	EQUE	ENCE	DESC	CRIP	rion	: SE	1D	NO:0	5:)						
Met 1	Met	Met	Gly	Asn 5	Val	His	Val	Ala	Ala 10	Leu	Leu	Leu	Asn	Tyr 15	Gly		
Ala	Asp	Ser	Asn 20	Cys	Glu	Asp	Pro	Thr 25	Thy	Phe	Ser	Arg	Pro 30	Val	His		
Asp	Ala	Ala 35	Arg	Glu	Gly	Phe	Leu 40	Asp	Thr	Leu	Val	Val 45	Leu	Hís	Gly		
Ser	Gly 50	Ala	Arg	Leu	Asp	val 55	Arg	Asp	Ala	Trp	Gly 60	Arg	Leu	Pro	Leu		
Asp 65	Leu	Ala	Gln	Glu	Arg 70	Gly	His	Gln	Asp	Ile 75	Val	Arg	Tyr	Leu	Arg 80		
Ser	Ala	Gly	Cys	ser 85	Leu	Cys	Ser	Ala	Gly 90	Trp	Ser	Leu	Cys	Thr 95	Ala		
Gly	Asn	Val	100	Gln	Thr	Asp	Gly	His 105	Ser	Phe	Ser	Ser	Ser 110	Thr	Pro		
Arg	Ala	1eu 115	Glu	Leu	Arg	Gly	Gln 120	Ser	Gln	Glu	Gln	Ser 125					
(2)	INFO	ORMA'	rion	FOR	SEQ	ID 1	10:7	:								~ .	
/	(i)	() () (4	QUENC A) LI B) T' C) S' D) TO	engti YPE : TRANI	nuc nuc	Bl ba leic ESS:	ase p acid	pair:	3								

## (ii) MOLECULE TYPE: cDNA (ix) FEATURE: (A) NAME/KEY: CDS (B) LOCATION: 1..231 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:7: GCA CTC CTG GAA GCC GGC GCA GAT CCC AAC GCC CTG AAC CGC TTC GGG 48 Ala Leu Leu Glu Ala Gly Ala Asp Pro Asn Ala Leu Asn Arg Phe Gly 1 AGG CGC CCA ATC CAG GTC ATG ATG ATG GGC AGC GCC AGG GTG GCA GAG 96 Arg Arg Pro Ile Gln Val Met Met Gly Ser Ala/Arg Val Ala Glu 20 CTG CTG CTC CAC GGA GCA GAA CCC AAC TGC/GCC GAC CCT GCC ACC 344 Leu Leu Leu His Gly Ala Glu Pro Asn Cys Ala Asp Pro Ala Thr 35 40 CTT ACC AGA CCT GTG CAC GAC GCA GCT CGG GAA GGC TTO CTG GAC ACG 192 Leu Thr Arg Pro Val His Asp Ala Ala Arg Glu Gly Pre Leu Asp Thr 55 CTT GTC GTG CTG CAC CGG GCA GGG GCG CGG PTG GAT GTG 231 Leu Val Val Leu His Arg Ala Gly Ala Arg Leu Asp Val 70 (2) INFORMATION FOR SEQ ID NO:8: (i) SEQUENCE CHARACTERISTICS: (A) LENGTH: 77 amino acids (B) TYPE amino acid (D) TOPOLOGY: linear (ii) MOLECULE TYPE: protein (xi) SEQUENCE DESCRIPTION: SEQ ID NO:8: Ala Leu Leu Gau Ala Gly Ala Asp Pro Asn Ala Leu Asn Arg Phe Gly 1 Arg Arg Pro Ile Gln Val Met Met Gly Ser Ala Arg Val Ala Glu 25

Leu Leu Leu His Gly Ala Glu Pro Asn Cys Ala Asp Pro Ala Thr
35
40
45

Lew Thr Arg Pro Val His Asp Ala Ala Arg Glu Gly Phe Leu Asp Thr

**7** 50 55 60

Leu Val Val Leu His Arg Ala Gly Ala Arg Leu Asp Val

- (2) INFORMATION FOR SEQ ID NO:9:
  - (i) SEQUENCE CHARACTERISTICS:
    - (A) LENGTH: 303 amino acids
    - (B) TYPE: amino acid
      (D) TOPOLOGY: linear
  - (ii) MOLECULE TYPE: protein
  - (v) FRAGMENT TYPE: N-terminal
  - (xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:
  - Met Ala Thr Ser Arg Tyr Glu Pro Val Ala Glu Ile Gly Val Gly Ala 1 5 10 15
  - Tyr Gly Thr Val Tyr Lys Ala Xaa Asp Pro His Ser Gly His Phe Val
  - Ala Leu Lys Ser Val Arg Val Pro Asn Gly Gly Gly Gly Gly Gly Gly Gly 35
  - Leu Pro Ile Ser Thr Val Arg Glu Val ala Leu Leu Arg Arg Leu Glu 50 55
  - Ala Phe Glu His Pro Asn Val Var Arg Leu Met Asp Val Cys Ala Thr
  - Ser Arg Thr Asp Arg Glu Ile Lys Val Thr Leu Val Phe Glu His Val
  - Asp Gln Asp Leu Arg Thy Tyr Leu Asp Lys Ala Pro Pro Pro Gly Leu
    100 105 110
  - Pro Ala Glu Thr Ile Lys Asp Leu Met Arg Gln Phe Leu Arg Gly Leu 115 120 125
  - Asp Phe Leu His Ala Asn Cys Ile Val His Arg Asp Leu Lys Pro Glu 130 135 140
  - Asn Ile Ley Val Thr Ser Gly Gly Thr Val Lys Leu Ala Asp Phe Gly 145 150 155 160
  - Leu Ala Arg Ile Tyr Ser Tyr Gln Met Ala Leu Thr Pro Val Val Val 165 170 175
  - Thr Leu Trp Tyr Arg Ala Pro Glu Val Leu Leu Gln Ser Thr Tyr Ala
  - thr Pro Val Asp Met Trp Ser Val Gly Cys Ile Phe Ala Glu Met Phe 195 200 205
  - Arg Arg Lys Pro Leu Phe Cys Gly Asn Ser Glu Ala Asp Gln Leu Gly 210 215 220
  - Lys Ile Phe Asp Leu Ile Gly Leu Pro Pro Glu Asp Asp Trp Pro Arg

Asp Val Ser Leu Pro Arg Gly Ala Phe Pro Pro Arg Gly Pro Arg Pro
245 250 255

Val Gln Ser Val Val Pro Glu Met Glu Glu Ser Gly Ala Gln Leu Leu 260 265 270

Leu Glu Met Leu Thr Phe Asn Pro His Lys Arg Ile Ser Ale Phe Arg 275 280 285

Ala Leu Gln His Ser Tyr Leu His Lys Asp Glu Gly Ash Pro Glu 290 295 300

## (2) INFORMATION FOR SEQ ID NO:10:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 326 amino acids
  - (B) TYPE: amino acid
  - (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: protein
- (v) FRAGMENT TYPE: N-terminal
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO: 10

Met Glu Lys Asp Gly Leu Cys Arg Ala Asp Gln Gln Tyr Glu Cys Val

Ala Glu Ile Gly Glu Gly Ala Tyr Gly Lys Val Phe Lys Ala Kaa Asp 20 25 30

Leu Lys Asn Gly Glf Arg Phe Val Ala Leu Lys Arg Val Arg Val Gln
35 40 45

Thr Gly Glu Gly Met Pro Leu Ser Thr Ile Arg Glu Val Ala Val
50 55 60

Leu Arg His Leu Glu Thr Phe Glu His Pro Asn Val Val Arg Leu Phe 65 70 75 80

Asp Val Cys Thr Val Ser Arg Thr Asp Arg Glu Thr Lys Leu Thr Leu 85 90 95

Val Phe Glu His Val Asp Gln Asp Leu Thr Thr Tyr Leu Asp Lys Val

Pro Glu Pro Gly Val Pro Thr Glu Thr Ile Lys Asp Met Met Phe Gln 115 120 125

Leu Leu Arg Gly Leu Asp Phe Leu His Ser His Arg Val Val His Arg 130 135 140

Asp Leu Lys Pro Gln Asn Ile Leu Val Thr Ser Ser Gly Gln Ile Lys 145 150 155 160 Leu Ala Asp Phe Gly Leu Ala Arg Ile Tyr Ser Phe Gln Met Ala Leu 165 170 175

Thr Ser Val Val Thr Leu Trp Tyr Arg Ala Pro Glu Val Leu Leu 180 185 190

Gln Ser Ser Tyr Ala Thr Pro Val Asp Leu Trp Ser Val Sly Cys Ile 195 200 298

Phe Ala Glu Met Phe Arg Arg Lys Pro Leu Phe Arg Gly Ser Ser Asp 210 215 220

Val Asp Gln Leu Gly Lys Ile Leu Asp Val Ile Gly Leu Pro Gly Glu 225 230 275 240

Glu Asp Trp Pro Arg Asp Val Ala Leu Pro Arg Gln Ala Phe His Ser 245 250 255

Lys Ser Ala Gln Pro Ile Glu Lys Pho Val Thr Asp Ile Asp Glu Leu 260 275 270

Gly Lys Asp Leu Leu Leu Lys Cys Leu Thr Phe Asn Pro Ala Lys Arg 275 280 285

Ile Ser Ala Tyr Ser Ala Leu/Ser His Pro Tyr Phe Gln Asp Leu Glu 290 300

Arg Cys Lys Glu Asn Leu Asp Ser His Leu Pro Pro Ser Gln Asn Thr 305 319 315 320

Ser Glu Leu Asn Thr Al.